

CLAIMS

What is claimed is:

1. A method for assembling a lens assembly, comprising the steps of
of
providing a housing having
5 a housing body,
a cylindrical bore in the housing body with an internal bore surface and a cylindrical housing axis,
at least one access window through the housing body that permits external access to an interior of the housing body, and
10 an interior helical recess in the bore surface;
providing a cylindrical lens element having an external cylindrical lens element surface received within the cylindrical bore of the housing and having a cylindrical lens-element axis coincident with the cylindrical housing axis, wherein the lens element includes
15 a lens positioned perpendicular to the cylindrical lens-element axis,
an adjustment engagement that is externally accessible through the access window of the housing, and
an exterior helical recess in the external cylindrical lens element surface, wherein the exterior helical recess has the same pitch as the interior helical recess and is in facing relation to the interior helical recess;
20 rotatably engaging the interior helical recess and the facing exterior helical recess with a thread wire; and
adjusting the axial position of the lens element by rotating the lens
25 element relative to the housing body.
2. The method of claim 1, including an additional step, after the step of adjusting, of
fixing the relative position of the lens element and the housing body.

3. The method of claim 1, wherein the step of fixing includes the step of
fixing the relative position with a mass of an adhesive.

4. The method of claim 1, wherein the method further includes providing a cylindrical second lens element having an external cylindrical second lens element surface received within the cylindrical bore of the housing, wherein the second lens element includes a second lens.

5. The method of claim 1, wherein the method further includes providing a cylindrical second lens element having an external cylindrical second lens element surface received within the cylindrical bore of the housing, wherein the second lens element includes a second lens and
5 wherein the second lens element is not movable relative to the housing.

6. The method of claim 1, wherein the method further includes providing a cylindrical second lens element having an external cylindrical second lens element surface received within the cylindrical bore of
5 the housing, wherein the second lens element includes
a second lens,
a second-lens-structure adjustment engagement that is externally accessible through the access window of the housing, and
a second exterior helical recess in the external cylindrical second
10 lens element surface, wherein the second exterior helical recess has the same pitch as the interior helical recess and is in facing relation to the interior helical recess, and
rotatably engaging the interior helical recess and a facing portion of the second exterior helical recess with a second thread wire.

7. The method of claim 6, wherein the step of rotatably engaging the interior helical recess and the facing second exterior helical recess includes the step of

5 providing the thread wire and the second thread wire as different portions of a length of a single piece of metal.

8. A method for assembling a lens assembly, comprising the steps of

5 providing a housing having
a housing body,
a cylindrical bore in the housing body with an internal bore surface and a cylindrical housing axis, and

at least one access window through the housing body that permits external access to an interior of the housing body;

10 providing a cylindrical lens element having an external cylindrical lens element surface received within the cylindrical bore of the housing and having a cylindrical lens-element axis coincident with the cylindrical housing axis, wherein the lens element includes

15 a lens positioned perpendicular to the cylindrical lens-element axis, and

an adjustment engagement that is externally accessible through the access window of the housing;

20 providing an axially continuously adjustable engagement between the lens element and the housing body, wherein the axially continuously adjustable engagement is externally adjustable from an exterior of the housing; and

adjusting an axial position of the lens element using the axially continuously adjustable engagement.

9. The method of claim 8, wherein the axially continuously adjustable engagement is a rotatable engagement between the lens element and the housing body, and the step of adjusting includes the step of

rotating the lens element relative to the housing body about the
5 cylindrical housing axis, thereby causing the lens element to move axially along the cylindrical housing axis.

10. The method of claim 9, wherein the axially continuously adjustable engagement includes a biasing spring that reacts between the lens element and the housing body.

11. The method of claim 9, including an additional step, after the step of adjusting, of

fixing the relative position of the lens element and the housing body.

12. A lens assembly comprising

a housing having

a housing body,

5 a cylindrical bore in the housing body with an internal bore surface and a cylindrical housing axis,

at least one access window through the housing body that permits external access to an interior of the housing body, and

an interior helical recess in the bore surface;

10 a cylindrical lens element having an external cylindrical lens element surface received within the cylindrical bore of the housing and having a cylindrical lens-element axis coincident with the cylindrical housing axis, wherein the lens element includes

15 a lens positioned perpendicular to the cylindrical lens-element axis,

an adjustment engagement that is externally accessible through the access window of the housing, and

20 an exterior helical recess in the external cylindrical lens element surface, wherein the exterior helical recess has the same pitch as the interior helical recess and is in facing relation to the interior helical recess; and

a thread wire received within and engaging the interior helical recess and a facing portion of the exterior helical recess.

13. The lens assembly of claim 12, wherein the lens element is helically rotatable relative to the housing.

14. The lens assembly of claim 12, further including
a retainer joining the lens element to the housing to prevent relative rotation of the lens element relative to the housing.

15. The lens assembly of claim 12, further including
a retainer joining the lens element to the housing to prevent relative rotation of the lens element relative to the housing, wherein the retainer is a mass of an adhesive.

16. The lens assembly of claim 12, further including
a cylindrical second lens element having an external cylindrical second lens element surface received within the cylindrical bore of the housing, wherein the second lens element includes a second lens.

17. The lens assembly of claim 12, further including
a cylindrical second lens element having an external cylindrical second lens element surface received within the cylindrical bore of the housing, wherein the second lens element includes a second lens and wherein the second
5 lens element is not movable relative to the housing.

18. The lens assembly of claim 12, further including
a cylindrical second lens element having an external cylindrical second
lens element surface received within the cylindrical bore of the housing,
wherein the second lens element includes
- 5 a second lens,
a second-lens-structure adjustment engagement that is externally
accessible through the access window of the housing, and
a second exterior helical recess in the external cylindrical second
lens element surface, wherein the second exterior helical recess has the same
10 pitch as the interior helical recess and is in facing relation to the interior helical
recess, and
a second thread wire received within and engaging the interior helical
recess and a facing portion of the second exterior helical recess.

19. The lens assembly of claim 18, wherein the thread wire and the
second thread wire comprise different portions of a length of a single piece of
metal.